



Management of enteromesenteric infarction in a non-university hospital. retrospective study over 11 years - personal experience

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Abstract. Introduction. The purpose of this study is to evaluate the management of patients with entero-mesenteric infarction associated with mesenteric ischemia hospitalized in S.M.U. PASCANI during 2013-2023 - personal experience. **Material and method.** The study includes a number of five cases of mesenteric ischemia diagnosed on the basis of clinical, imaging, biological and the establishment of associated risk factors subjected to immediate emergency surgery. **Results.** Survival of 60% is associated with the resection of the infarcted enteral segment, establishing the diagnosis and surgical urgency as immediate, shortening the time to surgery, operating time between 60-120 minutes. Enteral resection below 100 centimeters was not followed by short bowel syndrome. Ileocolic resection (1 case) larger than 150 centimeters associated with stoma and cardiac risk factors was incompatible with survival. **Discussions.** The follow-up in the following year in the case of intestinal infarction due to thrombosis of the mesenteric vein and the portal venous confluence highlighted the existence of risk factors for hereditary thrombophilia with homozygous genotype A1298C mutation, for the MTHFR gene, the C677C mutation for the same gene being negative, another risk factor hereditary thrombophilic was the heterozygous genotype for the PAI-1 gene (polymorphism 675 4G/5G). Abdominal-pelvic CT, with contrast agent administered intravenously, 6 months postoperatively revealed thrombosis of the left portal branch with cavernomatous transformation manifested by venous, perihilar, peripancreatic and periduodenal vascular clots, 12 months postoperatively CT revealed portal vein superior and inferior right branch within normal limits, left branch thrombosed and partially recanalized, VMS partially thrombosed, recanalized with cavernomatous aspect. **Conclusions.** Enteromesenteric infarction and the need to remove the intestinal necrotic area will still belong to the general/digestive/emergency surgeon. The dynamic follow-up of the patient's evolution highlights hemophilic risk factors less studied in laboratories not used with these kits. Establishing the appropriateness of transjugular porto-systemic sum in mesenteric thrombosis of VMS should be considered. Interventional radiology through endovascular revascularization must represent an objective of emergency hospital units.

Key word: acute abdomen, entero-mesenteric infarction, surgery

INTRODUCTION

Acute entero-mesenteric ischemia represents a surgical emergency, being similar in severity to myocardial infarction. The time elapsed from the beginning of an acute episode to the intervention should be shortened to less than six hours, after six hours of the total interruption of the blood flow, ischemia of the intestinal mucosa occurs, irreversible, with the reduction of cellular energy reserves of ATP, cell destruction, release of free radicals of oxygen, bacterial translocation, alteration of intercellular junctions at the capillary level, intestinal necrosis,

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peritonitis, ileus, sepsis and multiple organ failure. (1) The time elapsed from the surgical consultation to the operative moment, when required, reduced to a minimum - preferably under 1 hour. If we cannot influence the time interval from home to the Emergency Department, we can shorten the time required until the operative moment when we suspect entero-mesenteric ischemia.

It is preferable that abdominal-pelvic CT imaging with contrast substance administered intravenously with arterial as well as venous time be used with celerity in such suspected diagnosis. Biphasic abdominal CT with multiplane reconstruction to indicate the type of ischemia: arterial, venous, non-occlusive; the location and extent of the lesion represent the "gold standard" for mesenteric ischemia (1), (2).

In the absence of access to CT, RX. Empty abdomen with type result: hydroaerial levels or pneumoperitoneum require a surgical approach.

The symptomatology is represented by intense, imprecisely defined abdominal pain; nausea, vomiting, rarely melena or rectal bleeding.

Opioids like morphine are necessary for pain relief in acute mesenteric ischemia and their necessity requires abdominal-pelvic CT with multiphasic intravenous contrast. (3)

Clinical signs of abdominal muscle defense indicate an advanced stage of abdominal ischemia.

The patient's history of heart disease such as: atrial fibrillation, endocarditis, dilated cardiomyopathy or arterial disease such as: aortic atheromatosis, vasculitis, obliterating arteriopathy of the lower limbs may indicate acute or chronic occlusive mesenteric ischemia such as thrombosis or embolism.

History of hereditary thrombophilias: deficiency of protein C, protein S, antithrombin, lupus anticoagulant, factor V Leiden mutation, hyperhomocysteinemia by affecting the MTHFR gene - mutations C677T, A1298C; PAI-1 gene - polymorphism 675 4G/5G, can lead us to the thought of a diagnosis of acute or chronic mesenteric ischemia through mesenteric-portal vein thrombosis.

Biological evaluation at admission can show: leukocytosis, increases in lactate, increase in d-dimers, increase in fibrinogen, increase in PCR, increase in precalcitonin. All these biological markers have a moderate predictive value in the diagnosis of mesenteric ischemia. Other biological markers mentioned in the literature: I-FABP, alpha-GST, cobalt-ABA, citrulline, FGF-23, endothelin, IL-8, CK, SMP-22 were studied to increase the accuracy in the diagnosis of mesenteric ischemia. None of these studied markers demonstrated a high diagnostic accuracy. (4)

The delay in making the diagnosis of acute mesenteric ischemia is directly proportional to the increase in the mortality rate.

MATERIAL AND METHOD

The analysis of five cases of enteromesenteric infarction managed operatively between 2013 and 2023 in the Pascani Municipal Emergency Hospital is presented. - personal experience.

The classification of the type of ischemia was carried out on the basis of risk factors, imaging, intraoperative findings.

The following were excluded from the study: intestinal volvulus with enteromesenteric infarct, abdominal hernias, incarcerated abdominal hernias with enteromesenteric necrosis also subjected to intestinal resections.

Two cases represent occlusive enteromesenteric infarction by embolism of branches of the superior mesenteric artery.

One case represents occlusive enteromesenteric infarction due to thrombosis of branches of the superior mesenteric artery.

One case represents occlusive enteromesenteric infarction through thrombosis of the superior mesenteric vein and portal carrefour.

One case represents occlusive enteromesenteric infarction due to occlusion of the superior mesenteric artery, not being able to be classified as a form.

There were no cases of nonocclusive enteromesenteric infarction associated with arterial vasospasm.

Results

A case of enteromesenteric infarction type arterial embolism, with cardiac history of ischemic cardiomyopathy when evaluated in the emergency department: abdominal muscle defense, significant leukocytosis, free fluid in the peritoneal spaces on ultrasound, without pneumoperitoneum, intraoperatively: enteromesenteric infarction that included the first two loops intestinal - very rare localization of the infarction - which required resection of the first two intestinal loops and end-to-end jejunoduodenal anastomosis at the Treitz angle, with separate wires, monoplane. The evolution was without complications and he was discharged surgically cured.

A case of enteromesenteric infarction type arterial thrombosis, with a history of arteriopathy obliterans of the lower limbs, when evaluated in the emergency department: abdominal muscle defense, leukocytosis and prothrombin index 13%, without pneumoperitoneum, ultrasound: free fluid in the peritoneal spaces, intraoperatively: significant blood extravasation, with the first 10 centimeters of the first viable jejunal loop, with the next two infarcted loops (approx. 60-70cm), but with the possibility of the entero-enteral anastomosis to be performed latero-laterally in two planes. The evolution was favorable, without complications. Discharged surgically cured.

A case of enteromesenteric infarction type arterial embolism, with a history of atrial fibrillation, with a history of right hemicolectomy for right colon neoplasm, when evaluated in the emergency department: hematemesis and melena, significant leukocytosis, empty abdominal radiography: hydro-air levels; intraoperatively: ileal enteromesenteric infarction, with capture of the infarction and the ileo-transverse anastomosis area. In this case, enteral resection (ileo-colic) of approximately 100 centimeters was performed with a definitive ileostomy. The evolution was unfavorable, intestinal transit present on the stoma, but he died of toxic-septic shock and multiple organ failure 48 hours after surgery.

A case of enteromesenteric infarction type enteromesenteric venous thrombosis, without a history of cardiac pathology, at the

evaluation in the emergency department: abdominal muscle defense, cold sweats, feeling of suffocation in the supine position, pain not relieved even by morphine, leukocytosis, increased d-dimers, increased fibrinogen, negative troponin, low creatinine clearance. Abdominal-pelvic CT with intravenous contrast substance, with arterial and venous time: thrombosis of the superior mesenteric vein and portal carrfour, the last ileal loops with parietal thickening and with intramesenteric fluid. Intraoperatively: enteromesenteric infarction of the ileum, intraperitoneal and intramesenteric blood extravasation, but without the last ileal loop being caught, practicing resection of approximately 100 cm of ileum, with entero-enteral anastomosis in two planes. Favorable postoperative evolution, without complications and discharged surgically cured.

A case of arterial type enteromesenteric infarction, without a history of cardiac pathology, when evaluated in the emergency department: distended, occlusive abdomen, leukocytosis, empty abdomen x-ray: hydro-air levels, abdominal ultrasound: distended intestinal loops, free fluid between the intestinal loops. Intraoperatively: infarction of the small intestine and the right colon in total, above the surgical therapeutic resources, with unfavorable evolution and death due to toxic-septic shock and multiple organ failure 48 hours postoperatively.

Survival in the studied series was 60%, being influenced by immediate emergency surgery, surgical removal of the ischemic intestinal segment and as a result of reducing the circulation of some inflammatory cytokines, endotoxins, exotoxins, procoagulant factors, avoiding the development of toxic shock -septic.

The need to perform a terminal ileostomy in a case with an operated right colon neoplasm in which enteral ischemia also included the ileo-colic anastomosis area led to a short bowel syndrome that overlapped with the toxic-septic shock did not allow survival.

In the case of infarction of the entire small intestine and right colon, the surgical solution of total enterectomy and right colectomy would require intestinal transplantation to increase the chance of survival.

Discussions

Maintaining communication with the patient in the case of enteromesenteric infarction due to mesenteric mucosal thrombosis revealed through the hematological control at 3 months the existence of risk factors for hereditary thrombophilia with homozygous genotype for the A1298C mutation, for the MTHFR gene, the C677C mutation for the same gene being negative. The A1298C base exchange leads to a decrease in the activity of the MTHFR enzyme. Hemozygosity for the A1298 mutation is associated with increased levels of homocysteine and low levels of folate. Hyperhomocysteinemia is a recognized factor for arterial and venous thrombosis. Another factor with hereditary thrombophilic risk was the heterozygous genotype for the PAI-1 gene (polymorphism 675 4G/5G). The patient is a heterozygous carrier of the deletion in the promoter of the PAI-1 gene. Deletion of guanosine at position 675 in the promoter of the PAI-1 gene leads to an increase in PAI 1 in the blood. The increased concentration of PAI1 is a risk factor for thromboembolic disease. The study of the other factors: lupus anticoagulant, factor V Leiden mutation, protein C, antithrombin III, were within normal limits. Abdominal-pelvic CT, with contrast agent administered intravenously, 6 months postoperatively reveals thrombosis of the left portal branch with cavernomatous transformation manifested by a serpentine, tubular, perihilar, peripancreatic and periduodenal venous hem, permeable entero-enteric anastomosis, non-dilated intestinal loops, celiac trunk, superior and inferior mesenteric artery permeable, absence of intraperitoneal fluid. Abdominal-pelvic CT, with contrast substance administered intravenously, 12 months postoperatively, revealed the portal vein superior and inferior right branch within normal limits, left branch thrombosed and partially recanalized, VMS partially thrombosed, recanalized with cavernomatous appearance and important pericephalopancreatic circulation, intestinal loops of normal appearance, absence of fluid in the peritoneum. The evolution is still favorable under oral anticoagulant.

Data from the literature support in the case of porto-mesenteric mucosal thrombosis the prevention of intestinal necrosis by transjugular porto-systemic suture (TIPS), venous recanalization through loco-regional fibrinolytic agents. The transjugular porto-systemic suture is also necessary to prevent portal hypertension, the development of ascites and varicose veins esogastric (1), (5), (6). The association of TIPS, the injection of fibrinolytic agents with subsequent laparotomy with the removal of the necrotic intestinal segment can lead to increased survival, the gain of a functional intestinal segment and the limitation of the extension of entero-mesenteric thrombosis (7).

The current management in mesenteric ischemia involves restoring the mesenteric vascular flow, preserving as much intestine as possible and removing the necrotic intestine (2).

Laparotomy is required as the first surgical act when there is peritonitis, signs of occlusion and toxic-septic shock.

Access to interventional radiology allows as the first surgical act in mesenteric ischemia, without the situations that immediately require laparotomy, the endovascular approach and the application of the endovascular revascularization procedure with embolectomy or anterograde thrombectomy, the locoregional injection of fibrinolytic agents into the mesenteric artery, the verification of flow restoration, the need to stent the area stenotic (2), (8).

The restoration of the mesenteric arterial flow in the hybrid operating rooms allows, in case of damage at the origin of the AMS, to perform embolectomy, retrograde thrombectomy by discovering the occluded mesenteric artery with the help of imaging (angiography) and performing retrograde stenting - ROMS - retrograde stenting through open surgery of AMS (9).

The most common complications after endovascular mesenteric revascularization include: recurrence of occlusion by emboli or thrombi, stent thrombosis, vessel perforation or stent migration. All this leads to open surgery and increased mortality. (10)

In the absence of interventional radiology, the restoration of the mesenteric

vascular flow in open surgery does not stop the approach of the mesenteric artery either above the occlusion or below the occlusion followed by thrombectomy/embolectomy (with Fogarty probe) and angioplasty with venous patch or bypass with the external saphenous vein / synthetic graft. This type of surgical approach involves increasing the duration of the intervention, increasing the time of mesenteric ischemia, increasing postoperative morbidity and increasing morale.

Conclusions

The establishment of the risk factors for mesenteric ischemia together with the clinical suspicion require immediate evaluation by abdominal-pelvic CT with contrast substance administered intravenously in both the arterial and venous phase.

Enteromesenteric infarction and the need to remove the intestinal necrotic area will still belong to the general/digestive/emergency surgeon.

Making the diagnosis of mesenteric ischemia and shortening the time until intervention is a predictive factor for increasing the survival of these patients.

Shortening operating time in emergency hospital units by equipping hybrid operating theaters reduces morbidity and mortality.

Interventional radiology through endovascular revascularization must represent an objective of emergency hospital units.

Control of enteromesenteric damage by laparotomy/laparoscopy at 24-48 hours allows the removal of devitalized areas in the case of endoscopic revascularization.

The multidisciplinary team consisting of an interventional radiologist, a vascular surgeon and a general surgeon increases the life expectancy of these patients.

The treatment of patients with postoperative short bowel syndrome should be managed in specialized departments that also deal with home follow-up of these cases with multiple digestion problems and more.

Conflicts of interest: Does not exist

Abbreviations:

ATP- adenosine triphosphate

AMS- superior mesenteric artery

X-ray

CT- computerized tomography

MTHFR- methyl tetrahydrofolate reductase

PAI 1- plasminogen activator inhibitor

I-FABP- protein that binds intestinal fatty acids

Alpha - GST - alpha glutathione S transferase

C-ABA- antibodies that bind the cobalt-albumin complex

FGF-23 - fibroblastic growth factor

IL- interleukin

CK-creatine kinase

PCR- C-reactive protein

DD- D dimers

SMP - smooth muscle protein

TIPS- are transjugular porto-systemic

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